

REMARKS

Applicants respectfully request reconsideration of the present application in view of the reasons that follow.

A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

No claims have been amended by this Reply. Claims 20-41 and 43-56 remain pending in this application.

Allowable subject matter

Applicants appreciate the indication that claims 21-33, 35-36, 39, and 47 are allowed, and that claims 51 and 53 would be allowable if rewritten in independent form. Applicants have not amended claims 51 and 53 to be in independent form at this time, because applicants believe that claims 56 and 48, from which claims 51 and 53 respectively depend, are allowable.

Rejection under 35 U.S.C. § 102

Claims 20, 34, 37-38, 40-41, 43-46, 48-50, 52 and 54-56 stand rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,000,385 to Fukuma (hereafter "Fukuma"). Applicants respectfully traverse this rejection for at least the following reasons.

Independent claims 48 and 56 are directed to apparatuses comprising a means for calculating an estimated internal EGR quantity, and an internal EGR quantity estimating section to calculate a base internal EGR quantity, respectively. Independent claim 55 is a method claim comprising calculating a base internal EGR quantity. Thus, all of the independent claims currently under rejection, 48, 55 and 56, comprise structure for, or a step of, calculating an estimated or base internal EGR quantity. By contrast, Fukuma merely discloses estimation of an external EGR quantity.

Fukuma discloses estimating an external EGR, and not an internal EGR (as recited in claims 48, 55 and 56). As is well known in the art, the internal EGR is the recirculation of

exhaust gas which remains undischarged in a combustion chamber, and which is mixed with fresh intake air in the next engine operation cycle within the combustion chamber. By contrast, the external EGR is recirculation of exhaust gas discharged from a combustion chamber into an exhaust passage, through an EGR passage from the exhaust passage to an intake passage. Fukuma discloses estimation of the external EGR only. Fukuma discloses an EGR control valve 18 disposed in an EGR path 16 extending from an exhaust path 14 to an intake path 12 relative to diesel engine 10 (Figure 1, col. 5, lines 8-14). The amount of EGR gas recirculated via the exhaust path 14 is controlled via the EGR control valve 18 in the EGR path 16. Plainly, this EGR control valve controls exhaust gas already discharged from the combustion chamber, and in the exhaust path. Fukuma discloses only controlling the external EGR via the control valve in the EGR path 16, not an internal EGR quantity.

Moreover, in independent claims 48, 55 and 56, the calculation of the internal EGR quantity (estimated internal EGR quantity in claim 48, and base internal EGR quantity in claims 55 and 56) is in accordance with both the exhaust valve closing timing and the engine speed. Fukuma fails to disclose calculating an EGR quantity in accordance with both the exhaust valve closing timing and engine speed. Fukuma discloses calculating a target EGR ratio from the engine speed NE, sensed by an engine speed sensor 28, and a required amount of fuel injection Q, the value Q being determined from an accelerator divergence (depression degree) sensed by an accelerator sensor 26 and engine speed NE (see col. 6, lines 33-46). An actual air ratio λ is calculated in accordance with the concentration of oxygen in the exhaust path (col. 6, lines 49-54), and a converted actual EGR ratio is calculated on the basis of the concentration of oxygen in the intake path (col. 6, lines 56-60). Nowhere, however, does Fukuma disclose calculating an EGR quantity in accordance with both the engine speed and exhaust valve closing time. The portions of Fukuma cited by the Office Action do not give any indication of calculating EGR on the exhaust valve closing time. Thus, for this additional reason, Fukuma fails to anticipate any of claims 48, 55 and 56, and these claims are patentable over Fukuma.

Dependent claims 20, 34, 37-38, 40-41, 43-46, 49-50, 52 and 54 ultimately depend from one of claims 48, 55 and 56 and are patentable for at least the same reasons, as well as for further patentable features recited therein.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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